

SEQUENCE LISTING

<110> Dahiyat, Bassil I.
Luo, Peizhi

<120> NUCLEIC ACIDS AND PROTEIN VARIANTS OF hG-CSF WITH GRANULOPOIETIC
ACTIVITY

<130> A-67614-3/RMS/RMK

<150> US 60/115,131

<151> 1999-01-06

<150> US 60/118,831

<151> 1999-02-05

<150> US 09/479,313

<151> 2000-01-06

<160> 24

<170> PatentIn version 3.2

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35 40 45

Leu Leu Gly His Ser Leu Gly Ile Pro Trp Ala Pro Leu Ser Ser Cys
50 55 60

Pro Ser Gln Ala Leu Gln Leu Ala Gly Cys Leu Ser Gln Leu His Ser
65 70 75 80

Gly Leu Phe Leu Tyr Gln Gly Leu Leu Gln Ala Leu Glu Gly Ile Ser
85 90 95

Pro Glu Leu Gly Pro Thr Leu Asp Thr Leu Gln Leu Asp Val Ala Asp
100 105 110

Phe Ala Thr Thr Ile Trp Gln Gln Met Glu Glu Leu Gly Met Ala Pro
115 120 125

Ala Leu Gln Pro Thr Gln Gly Ala Met Pro Ala Phe Ala Ser Ala Phe
130 135 140

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Leu Glu Val Ser Tyr Arg Val Leu Arg His Leu Ala Gln Pro
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Lys Cys Leu Glu Leu Val Arg Lys Ile Gln Gly Glu Gly Ala Ala Leu
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Ile Glu Ile Leu Cys Ala Lys Tyr Lys Leu Cys His Pro Glu Glu Leu
 35 40 45

Val Leu Leu Gly His Ser Leu Gly Ile Pro Trp Ala Pro Leu Ser Ser
 50 55 60

Cys Pro Ser Gln Ala Leu Gln Leu Ala Gly Cys Leu Ser Gln Leu Leu
 65 70 75

Ser Gly Leu Phe Leu Tyr Gln Gly Leu Leu Gln Lys Leu Glu Gly Ile
 80 85 90 95

Ser Pro Glu Val Gly Pro Ile Leu Asp Thr Leu Ile Leu Glu Val Ala
 100 105 110

Asp Phe Ala Thr Ile Ile Trp Gln Leu Met Glu Glu Leu Gly Met Ala
 115 120 125

Pro Ala Leu Gln Pro Thr Gln Gly Ala Met Pro Ala Phe Ala Ser Ala
 130 135 140

Phe Gln Lys Glu Asp Gly Gly Val Leu Val Ala Ile Leu Leu Gln Ser
 145 150 155

Phe Leu Glu Val Ala Tyr Arg Val Leu Arg His Leu Ala Gln Pro
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 -1 1 5 10 15

Lys Leu Leu Glu Leu Val Arg Lys Ile Gln Gly Glu Ala Ala Ala Leu
 20 25 30

Leu Glu Glu Leu Cys Ala His Tyr Lys Leu Cys His Pro Glu Glu Leu
 35 40 45

Val Leu Leu Gly His Ser Leu Gly Ile Pro Trp Ala Pro Leu Ser Ser
50 55 60

Cys Pro Ser Gln Ala Leu Gln Leu Ala Gly Cys Leu Ser Gln Phe Leu
65 70 75

Ser Gly Leu Phe Leu Phe Gln Gly Leu Leu Gln Lys Leu Glu Gly Ile
80 85 90 95

Ser Pro Glu Leu Gly Pro Lys Val Asp Thr Leu Ile Leu Glu Ile Ala
100 105 110

Asp Leu Ala Thr Ile Ile Trp Gln Leu Met Glu Glu Leu Gly Met Ala
115 120 125

Pro Ala Leu Gln Pro Thr Gln Gly Ala Met Pro Ala Phe Ala Ser Ala
130 135 140

Phe Gln Lys Glu Asp Gly Gly Ile Leu Ile Ala Ile Leu Leu Gln Ser
145 150 155

Phe Leu Glu Val Ala Tyr Arg Val Phe Arg His Leu Ala Gln Pro
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-1 1 5 10 15

Lys Cys Leu Glu Leu Val Arg Lys Ile Gln Gly Glu Gly Ala Ala Leu
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Ile Glu Glu Leu Cys Ala His Tyr Lys Leu Cys His Pro Glu Glu Leu
35 40 45

Val Leu Leu Gly His Ser Leu Gly Ile Pro Trp Ala Pro Leu Ser Ser
50 55 60

Cys Pro Ser Gln Ala Leu Gln Leu Ala Gly Cys Leu Ser Gln Leu His
65 70 75

Ser Gly Leu Phe Leu Tyr Gln Gly Leu Leu Gln Ala Leu Glu Gly Ile
80 85 90 95

Ser Pro Glu Leu Gly Pro Thr Leu Asp Thr Leu Gln Leu Asp Val Ala
100 105 110

Asp Phe Ala Thr Thr Ile Trp Gln Gln Met Glu Glu Leu Gly Met Ala
115 120 125

Pro Ala Leu Gln Pro Thr Gln Gly Ala Met Pro Ala Phe Ala Ser Ala
130 135 140

Phe Gln Lys Glu Thr Gly Gly Val Leu Val Ala Ile Leu Leu Gln Ser
145 150 155

Phe Leu Glu Val Ala Tyr Arg Val Leu Arg His Leu Ala Gln Pro
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Leu Glu Glu Leu Cys Ala His Tyr Lys Leu Cys His Pro Glu Glu Leu
35 40 45

Val Leu Leu Gly His Ser Leu Gly Ile Pro Trp Ala Pro Leu Ser Ser
50 55 60

Cys Pro Ser Gln Ala Leu Gln Leu Ala Gly Cys Leu Ser Gln Phe His
65 70 75

Ser Gly Leu Phe Leu Phe Gln Gly Leu Leu Gln Ala Leu Glu Gly Ile
80 85 90 95

Ser Pro Glu Leu Gly Pro Thr Val Asp Thr Leu Gln Leu Asp Ile Ala
100 105 110

Asp Leu Ala Thr Thr Ile Trp Gln Gln Met Glu Glu Leu Gly Met Ala
115 120 125

Pro Ala Leu Gln Pro Thr Gln Gly Ala Met Pro Ala Phe Ala Ser Ala
130 135 140

Phe Gln Lys Glu Asp Gly Gly Ile Leu Ile Ala Ile Leu Leu Gln Ser
145 150 155

Phe Leu Glu Val Ala Tyr Arg Val Phe Arg His Leu Ala Gln Pro
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-1 1 5 10 15

Lys Leu Leu Glu Gln Val Arg Lys Ile Gln Gly Asp Ala Ala Ala Leu
20 25 30

Gln Glu Lys Leu Cys Ala Thr Tyr Lys Leu Cys His Pro Glu Glu Leu
35 40 45

Val Leu Leu Gly His Ser Leu Gly Ile Pro Trp Ala Pro Leu Ser Ser
50 55 60

Cys Pro Ser Gln Ala Leu Gln Leu Ala Gly Cys Leu Ser Gln Phe His
65 70 75

Ser Gly Leu Phe Leu Phe Gln Gly Leu Leu Gln Ala Leu Glu Gly Ile
80 85 90 95

Ser Pro Glu Leu Gly Pro Thr Val Asp Thr Leu Gln Leu Asp Ile Ala
100 105 110

Asp Leu Ala Thr Thr Ile Trp Gln Gln Met Glu Glu Leu Gly Met Ala
115 120 125

Pro Ala Leu Gln Pro Thr Gln Gly Ala Met Pro Ala Phe Ala Ser Ala
130 135 140

Phe Gln Arg Arg Ala Gly Gly Ile Leu Ile Ala Ser His Leu Gln Ser
145 150 155

Phe Leu Glu Val Ser Tyr Arg Val Phe Arg His Leu Ala Gln Pro
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20 25 30

Gln Glu Lys Leu Cys Ala Thr Tyr Lys Leu Cys His Pro Glu Glu Leu
35 40 45

Val Leu Leu Gly His Ser Leu Gly Ile Pro Trp Ala Pro Leu Ser Ser
50 55 60

Cys Pro Ser Gln Ala Leu Gln Leu Ala Gly Cys Leu Ser Gln Phe His
65 70 75

Ser Gly Leu Phe Leu Phe Gln Gly Leu Leu Gln Ala Leu Glu Gly Ile
80 85 90 95

Ser Pro Glu Leu Gly Pro Thr Leu Asp Thr Leu Gln Leu Asp Ile Ala
100 105 110

Asp Leu Ala Thr Thr Ile Trp Gln Gln Met Glu Glu Leu Gly Met Ala
115 120 125

Pro Ala Leu Gln Pro Thr Gln Gly Ala Met Pro Ala Phe Ala Ser Ala
130 135 140

Phe Gln Arg Arg Ala Gly Gly Ile Leu Ile Ala Ser His Ile Gln Ser
145 150 155

Trp Phe Glu Val Ser Tyr Arg Ala Phe Arg His Leu Ala Gln Pro
160 165 170

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Met Thr Pro Leu Gly Pro Ala Ser Ser Leu Pro Gln Ser Phe Leu Leu
-1 1 5 10 15

Lys Leu Leu Glu Gln Val Arg Lys Ile Gln Gly Asp Ala Ala Ala Leu
20 25 30

Gln Glu Lys Ile Cys Ala Thr Tyr Lys Leu Cys His Pro Glu Glu Leu
35 40 45

Val Leu Leu Gly His Ser Leu Gly Ile Pro Trp Ala Pro Leu Ser Ser
50 55 60

Cys Pro Ser Gln Ala Leu Gln Leu Ala Gly Cys Leu Ser Gln Phe His
65 70 75

Ser Gly Leu Phe Leu Phe Gln Gly Leu Phe Gln Ala Phe Glu Gly Ile
80 85 90 95

Ser Pro Glu Leu Gly Pro Thr Leu Asp Thr Leu Gln Leu Asp Val Ala
100 105 110

Asp Leu Ala Thr Thr Ile Trp Gln Gln Met Glu Glu Leu Gly Met Ala
115 120 125

Pro Ala Leu Gln Pro Thr Gln Gly Ala Met Pro Ala Phe Ala Ser Ala
130 135 140

Phe Gln Arg Arg Ala Gly Gly Ile Leu Ile Ala Ser His Leu Gln Ser
145 150 155

Phe Leu Glu Val Ser Tyr Arg Val Phe Arg His Leu Ala Gln Pro
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20 25 30

Gln Glu Lys Leu Cys Ala Thr Tyr Lys Leu Cys His Pro Glu Glu Leu
35 40 45

Val Leu Leu Gly His Ser Leu Gly Ile Pro Trp Ala Pro Leu Ser Ser
50 55 60

Cys Pro Ser Gln Ala Leu Gln Leu Ala Gly Cys Leu Ser Gln Leu His
65 70 75

Ser Gly Leu Phe Leu Tyr Gln Gly Leu Leu Gln Ala Leu Glu Gly Ile
80 85 90 95

Ser Pro Glu Leu Gly Pro Thr Leu Asp Thr Leu Gln Leu Asp Val Ala
100 105 110

Asp Phe Ala Thr Thr Ile Trp Gln Gln Met Glu Glu Leu Gly Met Ala
115 120 125

Pro Ala Leu Gln Pro Thr Gln Gly Ala Met Pro Ala Phe Ala Ser Ala
130 135 140

Phe Gln Arg Arg Ala Gly Gly Val Leu Val Ala Ser His Leu Gln Ser
145 150 155

Phe Leu Glu Val Ser Tyr Arg Val Leu Arg His Leu Ala Gln Pro
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Met Thr Pro Leu Gly Pro Ala Ser Ser Leu Pro Gln Ser Phe Leu Leu
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Lys Ala Leu Glu Gln Val Arg Lys Ile Gln Gly Asp Ala Ala Ala Leu
20 25 30

Gln Glu Lys Leu Cys Ala Thr Tyr Lys Leu Cys His Pro Glu Glu Leu
35 40 45

Val Leu Leu Gly His Ser Leu Gly Ile Pro Trp Ala Pro Leu Ser Ser
50 55 60

Cys Pro Ser Gln Ala Leu Gln Leu Ala Gly Cys Leu Ser Gln Leu His
65 70 75

Ser Gly Leu Phe Leu Tyr Gln Gly Leu Leu Gln Ala Leu Glu Gly Ile
80 85 90 95

Ser Pro Glu Leu Gly Pro Thr Leu Asp Thr Leu Gln Leu Asp Val Ala
100 105 110

Asp Phe Ala Thr Thr Ile Trp Gln Gln Met Glu Glu Leu Gly Met Ala
115 120 125

Pro Ala Leu Gln Pro Thr Gln Gly Ala Met Pro Ala Phe Ala Ser Ala
130 135 140

Phe Gln Arg Arg Ala Gly Gly Ile Leu Ile Ala Ser His Leu Gln Ser
145 150 155

Phe Leu Glu Val Ser Tyr Arg Val Leu Arg His Leu Ala Gln Pro
160 165 170

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Lys Leu Leu Glu Gln Val Arg Lys Ile Gln Gly Asp Ala Ala Ala Leu
20 25 30

Gln Glu Lys Leu Cys Ala Thr Tyr Lys Leu Cys His Pro Glu Glu Leu
35 40 45

Val Leu Leu Gly His Ser Leu Gly Ile Pro Trp Ala Pro Leu Ser Ser
50 55 60

Cys Pro Ser Gln Ala Leu Gln Leu Ala Gly Cys Leu Ser Gln Phe His
65 70 75

Ser Gly Leu Phe Leu Tyr Gln Gly Leu Leu Gln Ala Leu Glu Gly Ile
80 85 90 95

Ser Pro Glu Leu Gly Pro Thr Leu Asp Thr Leu Gln Leu Asp Val Ala
100 105 110

Asp Leu Ala Thr Thr Ile Trp Gln Gln Met Glu Glu Leu Gly Met Ala
115 120 125

Pro Ala Leu Gln Pro Thr Gln Gly Ala Met Pro Ala Phe Ala Ser Ala
130 135 140

Phe Gln Arg Arg Ala Gly Gly Val Leu Val Ala Ser His Leu Gln Ser
145 150 155

Phe Leu Glu Val Ser Tyr Arg Val Phe Arg His Leu Ala Gln Pro
160 165 170

<210> 13
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Met Thr Pro Leu Gly Pro Ala Ser Ser Leu Pro Gln Ser Phe Leu Leu
-1 1 5 10 15

Lys Leu Leu Glu Gln Val Arg Lys Ile Gln Gly Asp Ala Ala Ala Leu
20 25 30

Gln Glu Lys Leu Cys Ala Thr Tyr Lys Leu Cys His Pro Glu Glu Leu
35 40 45

Val Leu Leu Gly His Ser Leu Gly Ile Pro Trp Ala Pro Leu Ser Ser
50 55 60

Cys Pro Ser Gln Ala Leu Gln Leu Ala Gly Cys Leu Ser Gln Phe His
65 70 75

Ser Gly Leu Phe Leu Tyr Gln Gly Leu Leu Gln Ala Leu Glu Gly Ile
80 85 90 95

Ser Pro Glu Leu Gly Pro Thr Leu Asp Thr Leu Gln Leu Asp Val Ala
100 105 110

Asp Leu Ala Thr Thr Ile Trp Gln Gln Met Glu Glu Leu Gly Met Ala
 115 120 125

Pro Ala Leu Gln Pro Thr Gln Gly Ala Met Pro Ala Phe Ala Ser Ala
 130 135 140

Phe Gln Arg Arg Ala Gly Gly Ile Leu Ile Ala Ser His Leu Gln Ser
 145 150 155

Phe Leu Glu Val Ser Tyr Arg Val Phe Arg His Leu Ala Gln Pro
 160 165 170

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Gln Glu Lys Leu Cys Ala Thr Tyr Lys Leu Cys His Pro Glu Glu Leu
 35 40 45

Val Leu Leu Gly His Ser Leu Gly Ile Pro Trp Ala Pro Leu Ser Ser
 50 55 60

Cys Pro Ser Gln Ala Leu Gln Leu Ala Gly Cys Leu Ser Gln Phe His
 65 70 75

Ser Gly Leu Phe Leu Phe Gln Gly Leu Leu Gln Ala Leu Glu Gly Ile
 80 85 90 95

Ser Pro Glu Leu Gly Pro Thr Leu Asp Thr Leu Gln Leu Asp Val Ala
 100 105 110

Asp Leu Ala Thr Thr Ile Trp Gln Gln Met Glu Glu Leu Gly Met Ala
 115 120 125

Pro Ala Leu Gln Pro Thr Gln Gly Ala Met Pro Ala Phe Ala Ser Ala
 130 135 140

Phe Gln Arg Arg Ala Gly Gly Ile Leu Ile Ala Ser His Leu Gln Ser
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Phe Leu Glu Val Ser Tyr Arg Val Phe Arg His Leu Ala Gln Pro
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Gln Glu Lys Leu Cys Ala Thr Tyr Lys Leu Cys His Pro Glu Glu Leu
 35 40 45

Val Leu Leu Gly His Ser Leu Gly Ile Pro Trp Ala Pro Leu Ser Ser
 50 55 60

Cys Pro Ser Gln Ala Leu Gln Leu Ala Gly Cys Leu Ser Gln Leu His
 65 70 75

Ser Gly Leu Phe Leu Tyr Gln Gly Leu Leu Gln Ala Leu Glu Gly Ile
 80 85 90 95

Ser Pro Glu Leu Gly Pro Thr Leu Asp Thr Leu Gln Leu Asp Val Ala
 100 105 110

Asp Phe Ala Thr Thr Ile Trp Gln Gln Met Glu Glu Leu Gly Met Ala
 115 120 125

Pro Ala Leu Gln Pro Thr Gln Gly Ala Met Pro Ala Phe Ala Ser Ala
 130 135 140

Phe Gln Arg Arg Ala Gly Gly Val Leu Val Ala Ser His Leu Gln Ser
 145 150 155

Phe Leu Glu Val Ser Tyr Arg Val Leu Arg His Leu Ala Gln Pro
 160 165 170

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Met Thr Pro Leu Gly Pro Ala Ser Ser Leu Pro Gln Ser Phe Leu Leu
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 20 25 30

Gln Glu Lys Leu Cys Ala Thr Tyr Lys Leu Cys His Pro Glu Glu Leu
 35 40 45

Val Leu Leu Gly His Ser Leu Gly Ile Pro Trp Ala Pro Leu Ser Ser
 50 55 60

Cys Pro Ser Gln Ala Leu Gln Leu Ala Gly Cys Leu Ser Gln Leu His
65 70 75

Ser Gly Leu Phe Leu Tyr Gln Gly Leu Leu Gln Ala Leu Glu Gly Ile
80 85 90 95

Ser Pro Glu Leu Gly Pro Thr Leu Asp Thr Leu Gln Leu Asp Ile Ala
100 105 110

Asp Phe Ala Thr Thr Ile Trp Gln Gln Met Glu Glu Leu Gly Met Ala
115 120 125

Pro Ala Leu Gln Pro Thr Gln Gly Ala Met Pro Ala Phe Ala Ser Ala
130 135 140

Phe Gln Arg Arg Ala Gly Gly Val Leu Val Ala Ser His Leu Gln Ser
145 150 155

Phe Leu Glu Val Ser Tyr Arg Val Leu Arg His Leu Ala Gln Pro
160 165 170

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Met Thr Pro Leu Gly Pro Ala Ser Ser Leu Pro Gln Ser Phe Leu Leu
-1 1 5 10 15

Lys Leu Leu Glu Gln Val Arg Lys Ile Gln Gly Asp Ala Ala Ala Leu
20 25 30

Gln Glu Lys Leu Cys Ala Thr Tyr Lys Leu Cys His Pro Glu Glu Leu
35 40 45

Val Leu Leu Gly His Ser Leu Gly Ile Pro Trp Ala Pro Leu Ser Ser
50 55 60

Cys Pro Ser Gln Ala Leu Gln Leu Ala Gly Cys Leu Ser Gln Phe His
65 70 75

Ser Gly Leu Phe Leu Phe Gln Gly Leu Leu Gln Ala Leu Glu Gly Ile
80 85 90 95

Ser Pro Glu Leu Gly Pro Thr Leu Asp Thr Leu Gln Leu Asp Val Ala
100 105 110

Asp Phe Ala Thr Thr Ile Trp Gln Gln Met Glu Glu Leu Gly Met Ala
115 120 125

Pro Ala Leu Gln Pro Thr Gln Gly Ala Met Pro Ala Phe Ala Ser Ala
130 135 140

Phe Gln Arg Arg Ala Gly Gly Ile Leu Ile Ala Ser His Leu Gln Ser
145 150 155

Phe Leu Glu Val Ser Tyr Arg Val Phe Arg His Leu Ala Gln Pro
160 165 170

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Met Thr Pro Leu Gly Pro Ala Ser Ser Leu Pro Gln Ser Phe Leu Leu
-1 1 5 10 15

Lys Leu Leu Glu Gln Val Arg Lys Ile Gln Gly Asp Ala Ala Ala Leu
20 25 30

Gln Glu Lys Leu Cys Ala Thr Tyr Lys Leu Cys His Pro Glu Glu Leu
35 40 45

Val Leu Leu Gly His Ser Leu Gly Ile Pro Trp Ala Pro Leu Ser Ser
50 55 60

Cys Pro Ser Gln Ala Leu Gln Leu Ala Gly Cys Leu Ser Gln Phe His
65 70 75

Ser Gly Leu Phe Leu Phe Gln Gly Leu Leu Gln Ala Leu Glu Gly Ile
80 85 90 95

Ser Pro Glu Leu Gly Pro Thr Leu Asp Thr Leu Gln Leu Asp Val Ala
100 105 110

Asp Phe Ala Thr Thr Ile Trp Gln Gln Met Glu Glu Leu Gly Met Ala
115 120 125

Pro Ala Leu Gln Pro Thr Gln Gly Ala Met Pro Ala Phe Ala Ser Ala
130 135 140

Phe Gln Arg Arg Ala Gly Gly Val Leu Val Ala Ser His Leu Gln Ser
145 150 155

Phe Leu Glu Val Ser Tyr Arg Val Phe Arg His Leu Ala Gln Pro
160 165 170

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Met Thr Pro Leu Gly Pro Ala Ser Ser Leu Pro Gln Ser Phe Leu Leu
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Lys Ala Leu Glu Gln Val Arg Lys Ile Gln Gly Asp Ala Ala Ala Leu
20 25 30

Gln Glu Lys Leu Cys Ala Thr Tyr Lys Leu Cys His Pro Glu Glu Leu
35 40 45

Val Leu Leu Gly His Ser Leu Gly Ile Pro Trp Ala Pro Leu Ser Ser
50 55 60

Cys Pro Ser Gln Ala Leu Gln Leu Ala Gly Cys Leu Ser Gln Leu His
65 70 75

Ser Gly Leu Phe Leu Tyr Gln Gly Leu Phe Gln Ala Phe Glu Gly Ile
80 85 90 95

Ser Pro Glu Leu Gly Pro Thr Val Asp Thr Leu Gln Leu Asp Ile Ala
100 105 110

Asp Phe Ala Thr Thr Ile Trp Gln Gln Met Glu Glu Leu Gly Met Ala
115 120 125

Pro Ala Leu Gln Pro Thr Gln Gly Ala Met Pro Ala Phe Ala Ser Ala
130 135 140

Phe Gln Arg Arg Ala Gly Gly Val Leu Val Ala Ser His Leu Gln Ser
145 150 155

Phe Leu Glu Val Ser Tyr Arg Val Leu Arg His Leu Ala Gln Pro
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Met Thr Pro Leu Gly Pro Ala Ser Ser Leu Pro Gln Ser Phe Leu Leu
-1 1 5 10 15

Lys Ala Leu Glu Gln Val Arg Lys Ile Gln Gly Asp Ala Ala Ala Leu
20 25 30

Gln Glu Lys Leu Cys Ala Thr Tyr Lys Leu Cys His Pro Glu Glu Leu
35 40 45

Val Leu Leu Gly His Ser Leu Gly Ile Pro Trp Ala Pro Leu Ser Ser
50 55 60

Cys Pro Ser Gln Ala Leu Gln Leu Ala Gly Cys Leu Ser Gln Leu His
65 70 75

Ser Gly Leu Phe Leu Tyr Gln Gly Leu Phe Gln Ala Phe Glu Gly Ile
80 85 90 95

Ser Pro Glu Leu Gly Pro Thr Leu Asp Thr Leu Gln Leu Asp Val Ala
 100 105 110

Asp Phe Ala Thr Thr Ile Trp Gln Gln Met Glu Glu Leu Gly Met Ala
 115 120 125

Pro Ala Leu Gln Pro Thr Gln Gly Ala Met Pro Ala Phe Ala Ser Ala
 130 135 140

Phe Gln Arg Arg Ala Gly Gly Val Leu Val Ala Ser His Leu Gln Ser
 145 150 155

Phe Leu Glu Val Ser Tyr Arg Val Leu Arg His Leu Ala Gln Pro
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Met Thr Pro Leu Gly Pro Ala Ser Ser Leu Pro Gln Ser Phe Leu Leu
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Lys Leu Leu Glu Gln Val Arg Lys Ile Gln Gly Asp Ala Ala Leu
 20 25 30

Gln Glu Lys Leu Cys Ala Thr Tyr Lys Leu Cys His Pro Glu Glu Leu
 35 40 45

Val Leu Leu Gly His Ser Leu Gly Ile Pro Trp Ala Pro Leu Ser Ser
 50 55 60

Cys Pro Ser Gln Ala Leu Gln Leu Ala Gly Cys Leu Ser Gln Phe His
 65 70 75

Ser Gly Leu Phe Leu Phe Gln Gly Leu Leu Gln Ala Leu Glu Gly Ile
 80 85 90 95

Ser Pro Glu Leu Gly Pro Thr Leu Asp Thr Leu Gln Leu Asp Val Ala
100 105 110

Asp Leu Ala Thr Thr Ile Trp Gln Gln Met Glu Glu Leu Gly Met Ala
115 120 125

Pro Ala Leu Gln Pro Thr Gln Gly Ala Met Pro Ala Phe Ala Ser Ala
130 135 140

Phe Gln Arg Arg Ala Gly Gly Ile Leu Ile Ala Ser His Leu Gln Ser
145 150 155

Phe Leu Glu Val Ser Tyr Arg Val Leu Arg His Leu Ala Gln Pro
160 165 170